NOTES FOR GEORGIA TECH PRESIDENT WAYNE CLOUGH
Nunn Fellows Roundtable, April 5, 2005
"The Role of the Technological University in National, Regional Policy"

Context: world of the 21st century

- In broadest sense, technology is defined as humans modifying the natural world to better serve our needs.

- The course of human history: a progression from a little technology in a largely natural world to living in a vast labyrinth of technology in an ever-smaller natural world. European Engineer Juergen Mittelstrass: "Leonardo World"

- Have used science and technology to take the natural world into our own hands and make it an artifact. Problems are increasing likely to be the consequences of our own invention rather than the forces of nature.

- While true that technology helped create many of the problems we face, also true that technology holds the solutions.

- World population passed 6 billion in 1999, UN projects 10 billion later this century before it tapers off. Straining the closed and finite ecosystem of Earth:
    - Water shortages
    - Air pollution significant enough to cause lung damage and curtail agricultural growth
    - Global warming
    - Health considerations: more diseases like AIDS transferring from animals to humans as natural habitat is destroyed; aging population

- Combination of political and technological change also poses economic challenges:
    - Cold War ended in late '91 when Soviet Union broke apart and Berlin Wall came down. World no longer organized into two power blocs anchored by U.S. and USSR.
    - Technology, especially telecommunications and Internet, made international communication instantaneous, inexpensive. Much easier to do international business.
    - U.S. used to be able to coast on its competitive edge. Now other countries are catching up; we are no longer assured of economic, technological leadership.
        - China, India offering technological workforce at lower cost; investing in quality education, R&D

- Political challenges have also increased
    - Without the rigid structure of 2 super-powers, world is more in flux, opportunities for old animosities, ethnic disagreements to flare up.
    - Technology now the deciding factor between the haves and have-nots.
    - Technology-driven global economy promotes openness and democratic behavior; a threat to closed societies who are lashing out – terrorism.

How does U.S. maintain leadership in this environment? How do research universities contribute?

- Innovation
  - "The world leaders in innovation and creativity will also be world leaders in everything else." (Harold McAlindon, author & business consultant)
  - Innovation is not only making new scientific discoveries, inventing new technology, but also figuring out imaginative ways put it to work – being first on the market with creative products and services.
  - National Innovation Initiative: national leaders develop blueprint to create favorable national environment:
    - Investment, the financial dimension
    - Talent, the human dimension
    - Infrastructure, the framework (includes policy as will as physical infrastructure)

- Investment:
  - Balancing the nation's R&D portfolio: move all disciplines forward together to enable interdisciplinary innovation.
  - Changing investment climate: more risk-tolerant, longer-term view

- Talent: nation depends on its universities
  - China, India, EU each graduate more engineers than U.S.
  - Visa problems; security restrictions on international tech students = inhospitable climate in the U.S. Best talent in the world, which used to come here, is now going elsewhere.
  - Need to revamp technological education to produce graduates who understand innovation.

- Infrastructure:
  - Increasing attention to IT networks as infrastructure; must be expanded to handle increasing users, new devices.
  - Policy, the invisible infrastructure
    - Innovation economy calls for balancing things we are used to thinking of as opposites:
      - Competition and collaboration
      - Openness and security
      - National interests and globality
      - IP and information sharing
      - Ambiguity and analysis
    - Many of these balances require wise policy.

- Universities need to speak out on these 3 issues
  - Importance of speaking with one voice
  - Organizations enable that to happen: AAAS, Council on Competitiveness

- Personal involvement in PCAST, National Science Board, Council on Competitiveness, NII

- Also need for technological expertise that universities can provide in broad array of policy arenas as technology becomes more pervasive in all areas of life:
  - Elected officials and most of their staff are really technologically illiterate, yet they are called upon to make many decisions about technology from broadband service to sewers that have far-reaching consequences.
  - Technologically minded people (engineers, e.g.) can help public officials understand the context and ramifications of their decisions.
  - Public policy decision-making would also benefit from the problem-solving skills of engineers:
    - Politicians: begin with predetermined answer based on partisan ideology, try to construe the facts and data to make a case for that answer.
    - Engineers: begin by analyzing and understanding the problem, then work through the data and details in an objective, orderly manner to construct the best possible solution.
  - Not talking about engaging in partisan politics, or supporting this or that candidate, but rather providing objective information that gives elected officials a basis for sound decisions.